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ABSTRACT

Efforts of a junior-college staff to provide materials which students in college transfer, terminal, or noncredit programs can read are described. Since the community college has an open enrollment plan, the needs in this regard are widely varied. In order to meet those needs, a study was made of the 358 students in the college's initial enrollment population. The Nelson-Denny Reading Test was administered in order to determine reading levels and abilities. About 30 percent of the students were reading at or above grade level, around 33 percent were reading slightly below grade level, and around 36 percent were reading considerably below grade level. The Dale Chall readability formula was applied to texts to determine levels of reading ability needed to understand these materials. Considerable discrepancies were noted between the two, since nearly half of the texts required grade level reading ability or better and none was suitable for the poorest readers. It was suggested that efforts be made to match students with texts they can understand and to guide students into appropriate courses. Recommendations for improving the program and for encouraging publishers to produce more readable materials were made. Tables of textbook readability levels and references are included. (MS)

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A Comparison of Reading Ability of Junior College Students with the Readability Levels of Assigned Texts

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The old adage, "Big oaks from little acorns grow", is quite descriptive of this project. During the first quarter in which Hillsborough Junior College was in operation, the Dean of Instruction requested a readability level index of a certain textbook because the students using this particular text had expressed difficulty in reading it. When the Dale-Chall Readability Formula (6) was applied to this text, one used in a course designed for junior college terminal students considered unable to pursue academic work, the readability level of 16+ (College-Adult Level) was obtained. Needless to say this text was immediately discarded in pursuit of something more suitable.

Because Hillsborough Junior College was developed as a comprehensive community open-door college to serve the needs of an urban population, three major types of curricula are offered, college transfer, two-year terminal programs, and community service non-credit courses. This curriculum concept demanded that student needs be determined before or shortly after the student's initial orientation. In an effort to identify these needs, the school undertook the administration of a reading test to all students during the first quarter of operation. At this testing session, the Nelson-Denny Reading Test, Form A Revised Edition (12) was given to a total of 358 students in twenty classes. None of the students were tested more than

once. Those students who had taken the test previously were excused from class for the testing period.

The results of this testing are shown in Table 1 and revealed the following about the reading ability of the initial population of Hillsborough Junior College. The table shows 30.2% of the students were reading at or above grade placement (13th grade and above); 33.5% were reading slightly below grade placement, or scored at the senior high school level; 32.1% scored at the junior high school level and 4.2 scored below the junior high school level on the Nelson-Denny Reading Test.

TABLE I

READING SCORES OF INITIAL POPULATION

Reading Scores	N	Per Cent of Total
13.8	64	17.9
13	44	12.3
10-11-12	120	33.5
7-8-9	115	32.1
- 7	15	4.2
	N = 358	

These figures do not appear inconsistent with estimates made by Hadley (7) that 95 per cent of college entrants lack adequate study skills and that a relatively small per cent have reading speeds and comprehension skills adequate for preparation of their college assignments. After a careful eight year study of entering freshmen, Halfter and Douglass (8) concluded that two-thirds of their entering college freshmen lacked reading skills required for academic success.

Utilization of Readability Levels of Texts

Although no readability levels have been attempted with any materials in music, foreign language, or in any of the business education areas, selections from all other disciplines have been analyzed.

The information concerning the readability levels of texts is used in various ways. For example, in one area of social sciences, the instructor has determined the level of his text and supplementary materials. He administers the reading test each term to his students or obtains the scores on those already tested, and makes his assignements according to the results. For the students with a certain pre-determined reading level, he assigns reading materials and does not require attendance at lecture sessions. Those students who are not considered adequately prepared to read their text material and other supplementary reading assignments are required to attend class lecture sessions.

In another area of social sciences, the instructor has multi-level texts and the student is assigned a text according to his reading level. Incidentally, it is the contention on this campus that a student with a high reading level is just as deserving of attention to his reading needs as is a student on a low reading level.

As stated by Bentley and Galloway (3), the usefulness of the tool of reading is lost if the material to be read does not reasonably match the capability of the reader. If the material is too difficult, the student will not comprehend; if it is too simple, the student may be insulted and/or bored. In either case, learning suffers.

The readability level of a text is also utilized in the selection of the text for a course. The person or persons responsible for the

selection of a text examine and select two, three, or sometimes more copies in which they are interested. The readability level of the text is then determined by applying the Dale-Chall Readability Formula. However a text selection is not necessarily made because of a low readability level. Other factors such as the qualifications of the author, organization of the book, content, presentation, appearance, accuracy, adaptability, illustrations and teaching aids available, may be taken into consideration. (13) Recently, for example, a text in the social science area was considered for adoption. Of the three books finally considered, one was ninth-tenth, one was eleventh-twelfth grade, and one had a readability score of grades thirteen through fifteen. For this particular adoption, the one showing an eleventh-twelfth grade level was selected because summaries were presented at the end of each chapter, study helps were given for the students, and a thorough index was also included.

For some areas of new programs still in the developmental stages, such as Nursing and Nuclear Medicine Technology, the personnel responsible for these programs have used the readability levels of their essential textual materials as one criterion for the establishment of requirements in their respective areas.

These examples given represent only a few ways in which the Dale-Chall Readability Formula is utilized at Hillsborough Junior College to insure correct individual assignments in appropriate reading material.

Textbook Readability Levels Compared With Actual Student Reading Levels

The reading level scores for four classes in the social science areas were compared with the readability level of the required text used for the

course in which these students were enrolled. Table II presents these data. For each student, a difference score was computed by subtracting the reading level score obtained by that student from the readability level of the text being used in the student's course. The algebraic sum of these difference scores for each student, and their squares, appears in colums (3) and (4) respectively. It should be noted that the substantial positive value of these differences reflects the general tendency of the texts being used to have a readability level above the reading level of the students using them.

The statistical significance of the mean difference (column 5) observed for the four classes was tested by use of the "z" ratio, where the observed difference in each class was compared with a possible zero difference. The purpose of applying the "z test" is of course to determine whether the observed differences are of such magnitude that they are not likely the result of chance, sampling error, but do most likely represent real differences.

As columns (6) and (7) show, the "z" values for every class indicated that the observed difference was statistically significant. ($< .0001$ level). Therefore, the readability level of the text being used tends to be significantly higher than the reading level of the students using the texts. The size of this discrepancy is of course represented by the mean differences of column 5.

Table III compares the readability scores of a Guided Studies English text with the reading ability of the students using this text. The comparisons were made in the same way as the Table II comparisons. The data are also arranged in the same pattern used in Table II. Once again, the "z" ratio of 3.916 indicates that the observed difference is significantly

different from zero. The Guided Studies English text is, therefore, in terms of readability level, significantly above the reading level of the students.

Textbook Readability Levels Compared With Initial Student Reading Levels

The readability level of a selection of textbooks used at Hillsborough Junior College was compared with the reading scores of the initial school population.

The results of the textbooks analyzed are recorded in Table IV. Of the twenty texts analyzed, eight had a readability score above the 16th grade level. Fewer than 30.2 per cent of the students enrolled in the college would be able to read these texts. Three of these texts, one in electronics, one in data processing and one for a Guided Studies English course are used in terminal courses not considered for academic credit or for students capable of pursuing an associate degree.

These terminal students are further disadvantaged with respect to their possibilities for supplemental reading. After analyzing 78 pieces of occupational information literature from 24 different sources, two-thirds of which ranked as "very difficult" while another 32 per cent ranked "difficult", Brayfield and Reed (4) concluded that current occupational information falls far short of meeting the requirements for comprehension and interest although these factors have been suggested for years by persons intimately concerned with the preparation and use of such information.

According to Table IV, of the texts analyzed in the areas of business administration, social science, and political science, neither are appropriate for use at the junior college level.

One text analyzed used in a Freshman English class, one in sociology, one in Latin America, and one chemistry text had a readability score of 13-15. Fewer than one-third of the students in the initial population group would be able to read these texts.

Furthermore, the appropriateness of these texts is made even more questionable in view of the following comments relevant to application and interpretation of the Dale-Chall Readability Formula:

> The reader's purpose in reading and his interest and background in the subject-matter must also be considered by anyone using a readability formula. To say that a given article on chemistry is comfortable reading for average adults because it has a predicted grade level of VII-VIII, is giving an incomplete picture. For those readers who have no interest or no background in chemistry, the article will probably not be comfortable reading and they may get very little meaning from it. For other readers who are interested in chemistry and do considerable reading in the subject, the same article will probably be most comfortable reading. This difference in ease of reading and comprehension may exist even though both groups of readers have completed approximately eight and one-half years of schooling and have the same general reading ability on a standardized reading test. (6)

Considering these points, it would be very probable that of this group of students (fewer than one-third), only a fraction would be actually able to read the texts comfortably.

Of the texts shown on this Table, only those in nursing, biology, education, economics, and one terminal degree English course appear to be written on a reading level appropriate for over one-third of the students at this college. However, the reading achievement of the students enrolled in these courses provide more realistic data for determining the needs that are to be met by a particular textbook. (2)

Conclusions and Recommendations

Of the twenty texts analyzed, eight had readability level scores of 16+ (College-Adult Level), practically eliminating the utility of these books at the junior college level. Of these eight texts, three were selected for use by students in non-academic or remedial-type courses.

An additional four texts had a readability level score of 13-15. This readability score encompasses the grade levels (13-14) for junior college transfer credit work. However, one must be cautious in making the assumption that these texts would be appropriate for use at this level. Mallinson (10) warned that in order to be an effective learning tool the reading difficulty of books must be at least one grade level below the reading level of the students for whom the text is assigned.

An analysis of this report seems to indicate that texts used in the lower-level and/or non-credit type courses are written on a more difficult readability level than those used in the courses for college credit. The recommendation is therefore being made that instructional materials selected be commensurate with the individual student's reading level.

The recommendation is further made that publishing houses give serious consideration to employing a readability index, student aids, and other factors of readability, and then make these facts known in their advertising literature to prospective purchasers of the materials.

If, as so often expressed, no wholly reliable formulas for grading college level reading material exist, then some action should be taken to arrive at some method for reliable measure for these materials. (9) Numerous attempts have already been made to develop a satisfactory technique for determining the level of reading difficulty of printed materials.

Michaelis and Tyler (11) contended that different formulae may be more suitable for some materials than for others and that there is need for research to determine the most appropriate formula to use with specific types of materials in that present techniques really do not assess the difficulty of the concepts found in the materials. Cosper and Griffin (5) are in agreement that in spite of the current vogue for reading formulas which try to assess reading ease on a mathematical scale, it is almost impossible to consider word and sentence length in conjunction with content and arrive at fine distinctions in level of difficulty and reader interest. However, it was not the intent of this paper to compare different readability formulas, to discuss the reliability of readability formulas, or to point out the justification for the utilization and application of a readability formula to textual material. As stated earlier, the first obstacle in the utilization of readability formulas is not the grossness of their estimates but that of the lack of employment by people who use printed material for instruction. School people should have the same concern about readability as there is about the reading ability of students. The variability of reading skill of adult level students demands that teachers be knowledgeable about the appropriateness of the materials used for developing content and concepts in their courses. (1)

TABLE II

A COMPARISON OF THE READABILITY LEVEL OF A SOCIAL SCIENCE TEXT WITH THE READING LEVEL OF STUDENTS USING IT

(1) Class	(2) N	(3) Σd	(4) Σd^2	(5) $\frac{\Sigma d}{N} = \overline{X_d}$	(6) Z	(7) p
I	28	45.049	104.146	1.609	4.335	<.0001
II	29	50.393	124.443	1.738	4.439	<.0001
III	28	52.046	137.319	1.859	4.361	<.0001
IV	25	39.976	92.085	1.599	4.082	<.0001

TABLE III

A COMPARISON OF THE READABILITY LEVEL OF A GUIDED STUDIES ENGLISH TEXT WITH THE READING LEVEL OF STUDENTS USING IT

(1) Class	(2) N	(3) Σd	(4) Σd^2	(5) $\frac{\Sigma d}{N} = \overline{X_d}$	(6) Z	(7) p
I	21	48.538	146.293	2.311	3.916	<.0001

TABLE IV

DALE-CHALL READABILITY LEVELS OF SELECTED TEXTS
IN VARIOUS DISCIPLINES

Text	Discipline	Raw Score Average	Corrected Grade Levels
A	Business Administration	10.143	16+
B	Business Administration	13.031	16+
C	Guided Studies English	9.460	16+
D	Communications	8.337	11-12
E	English	9.004	13-15
F	Biology	8.637	11-12
G	Education	8.054	11-12
H	Economics	7.939	10-11
I	Economics	7.692	9-10
J	Political Science	10.534	16+
K	Political Science	10.197	16+
L	Sociology	9.035	13-15
M	Social Science	10.469	16+
N	Chemistry	9.548	13-15
O	Electronics	10.213	16+
P	Latin America	9.598	13-15
Q	Data Processing	10.5396	16+
R	Nursing	8.651	11-12
S	Nursing	8.254	11-12
T	Nursing	7.779	9-10

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